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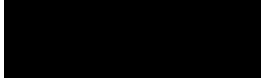

**WESTMORLAND SHOPPING CENTRE CAR PARK
KENDAL**

**REPAIR SPECIFICATION
&
BILL OF QUANTITIES**

Revision	Date	Purpose
ISSUE 01	27/04/2021	TENDER

DOCUMENT CONTROL

Project: Westmorland Shopping Centre Car Park, Kendal
Project Number: K37544
Project Description: Repair Specification & Bill of Quantities

Issue	Date	Prepared by	Checked by	Approved by
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1.0 **BACKGROUND INFORMATION**

1.1 Location & Description

The Westmorland Shopping Centre Car Park is located off Blackhall Road in the centre of Kendal at National Grid Co-ordinates 351610E, 492910N as shown in Figure 1.1 below. The car park is operated and maintained by South Lakeland District Council (SLDC).

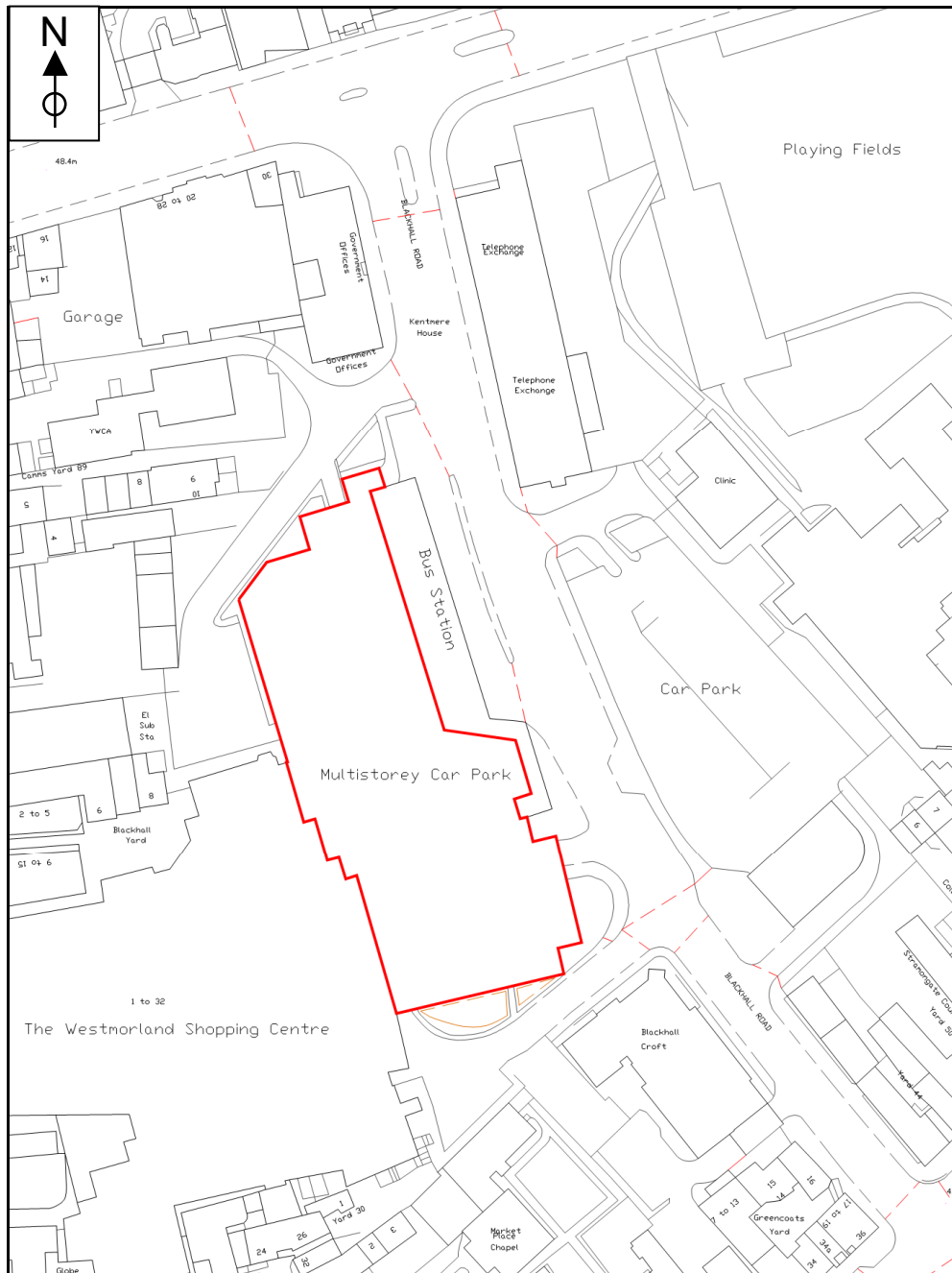


Figure 1.1 Site Location Plan

There is one vehicular entrance into the car park along the northern elevation and a double lane exit directly onto Blackhall Road along the eastern elevation. Along the south-western elevation the car park backs onto the shopping centre and provides direct pedestrian access at Levels 3 and 5. The central bus station is located directly along the eastern elevation and benefits from a glazed canopy that forms part of the external cladding to the car park. The Citizen's Advice Bureau offices are also located along the eastern elevation and are partially within the envelope of the car park structure. Blackhall Road is one of the main vehicle thoroughfares in Kendal and consequently the surrounding area is characterised by residential properties, offices and delivery yards for the shopping centre.

1.2 Form of Construction

The car park comprises two separate adjoining structures as indicated in Figure 1.2. The older car park structure, located to the south, comprises 7 no. storeys and was constructed during the 1960's. For ease of reference the older car park structure will be referred to as WSCCP1, and each of the level numbers will be followed by the suffix "B" (except for Levels 6 & 7). There are no historical records or construction drawings available for this structure but it has been confirmed that the structure is primarily of a reinforced concrete lift-slab construction with areas of cast in-situ concrete slab along the edges and along the boundary with the shopping centre. The original external cladding generally comprises precast concrete balustrade units, edge panels, quoins and fin units.

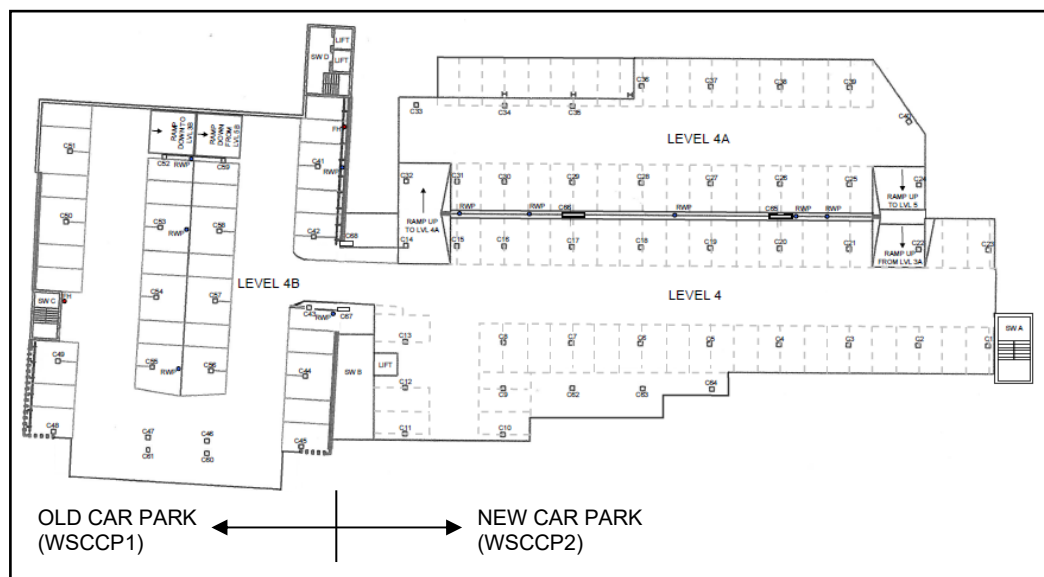


Figure 1.2 Typical car park layout (Level 4 shown)

The original car park construction was later extended, modified and refurbished during the 1990's. The newer car park structure, located to the north, comprises 5 no. storeys of split level. For ease of reference the newer car park structure will be referred to as WSCCP2, with the upper split level number followed by the suffix "A", and the lower split level number without a suffix. There is limited information available for this structure but construction drawings indicate the structure to be a post-tensioned reinforced concrete lift-slab on reinforced concrete columns. Cladding is formed principally by blockwork walls built off the floor slabs with an external render applied. A slate mansard canopy roof feature forms the roof to the car park at Level 5 and 5A in the new car park and Level 7 in the old car park.

1.3 Previous works undertaken in 2011

During the period of September to December 2011 a significant number of concrete repairs, deck waterproofing and other ancillary works were undertaken and comprised the following:

- Concrete repairs to all significant defects located within the concrete decks (slabs and soffits), concrete walls and precast concrete units (parapets, fins and quoins). Repairs were primarily undertaken where concrete had clearly delaminated and spalled exposing corroded reinforcement steel (identified as 'high' severity defects in the 2010 Structural Condition Survey). Galvanic (sacrificial) anodes were installed in every concrete repair to enhance repair longevity and help mitigate future repair failure due to ongoing corrosion of the underlying reinforcement.
- The failed deck coatings in WSCCP1 were fully replaced with a new heavy duty waterproofing and surfacing system provided by Triflex with an associated 10 year warranty. Level 1B had no previous deck coating system and did therefore not benefit from a new waterproofing membrane due to SLDC budgetary constraints at that time.
- The original asphalt waterproofing surface coating to the external level in WSCCP2 (Level 5/5A) was covered with a new heavy duty waterproofing and surfacing system provided by Triflex.
- Concrete repairs were undertaken at column/slab interfaces throughout WSCCP2.

- External repairs were undertaken to rendered cladding, plus the replacement of damaged and missing roof tiles and the replacement of a damaged window in one of the stairwells.
- The access road serving as the car park entrance and exit were resurfaced with asphalt.

As-built records of all repairs undertaken in 2011 were produced by RGP and were included in the post-construction CDM Health & Safety file for reference.

1.4 Previous works undertaken in 2015

During September 2015 further repair and rehabilitation works were undertaken at the car park and comprised the following:

- Concrete repairs were undertaken to a number of areas of existing internal reinforced and precast concrete. Galvanic anodes were installed in each concrete repair.
- The existing expansion joints between WSCCP1 and WSCCP2 on Levels 2, 3, 4 & 5 were replaced with a new mechanical joint system by Radflex
- A number of drainage channels were cleaned and lined with a waterproof coating, and fitted with new gratings.
- Damp and rotten timber rafters to the mansard roof on Level 5B were replaced to mitigate water ingress.
- A small number of splits/tears identified in the existing Triflex deck coating located on Levels 5 and 5A in WSCCP2 were repaired as per the Triflex specification.
- All the internal walls and columns within WSCCP2 were re-painted.

2.0 **SCOPE OF WORKS**

2.1 **Introduction**

The proposed works described in the following sections should be read in accordance with the Bill of Quantities (BoQs), which is included in **Appendix A**. The following Specification should also be read in association with all other Tender and CDM documentation produced by SLDC, Day Cummins and R. G. Parkins & Partners Ltd (RGP). The Tendering Contractor should ensure that their prices include for **ALL** works as detailed below and within the BoQs. Any ambiguity, discrepancy or doubt the Tenderer may have as to the true extent of the work involved shall be referred to *The Contract Administrator* for clarification in writing as early as possible during the Tender Period. No claim for extra payment will be recognised at a later date consequent upon any such ambiguity, discrepancy or doubt upon the part of the Tendering Contractor.

The Repair Specification and Bill of Quantities are based on the *Standard Method of Measurement for Concrete Repair*, 3rd Edition as published by the Concrete Repair Association [1]. This method of measurement provides a uniform basis for measuring concrete repair works in accordance with BS EN 1504 [2]. The repairs identified in this document have been derived from the 2019 Annual Inspection Report produced by RGP and subsequent site visits and surveys [3]. A copy of the Schedule of Repairs and Repair Location Plans are included in **Appendix B**. The works are detailed below.

2.2 **Install New Waterproof Deck Coating to Levels 2, 2A, 3, 3A, 4 & 4A**

A new waterproofing deck coating is to be installed on Levels 2, 2A, 3A, 4 and 4A in WSCCP2 to enhance the level of protection and mitigate water penetration to underlying levels. This is to include all concrete vehicle ramps and any areas of existing asphalt surfacing.

The works are to include **ALL** drainage channels, deck edges, parapet upstands and other ancillary areas on Levels 2, 2A, 3A, 4 and 4A in WSCCP2. The works also include the replacement of **ALL** line markings and direction arrows on a (typically) like-for-like basis on Levels 2, 2A, 3A, 4 and 4A in WSCCP2 using Triflex products as per the Triflex specification. New 1.0m wide pedestrian walkways are to be installed on each level between the driving lanes and parking bays.

The new waterproof deck coating is to be installed in full accordance with the Triflex specification included in **Appendix C** and **Appendix D** by an approved Triflex

installer. Note that the **Triflex DeckCoat System using Triflex Cryl Primer 287** is proposed for the concrete areas and that the **Triflex DeckFloor System using Triflex Cryl Primer 222** is proposed for the asphalt areas. Therefore, the work should be priced accordingly as covered under *Bill 4* in the BoQs.

The relevant car park surfaces will need to be **FULLY** prepared, scarified, infilled, levelled and/or planed before application of the new deck coating systems in strict accordance with the Triflex specifications. The Tendering Contractor is to ensure that they price for **ALL** elements of this work. The costs associated with the surface preparation works are to be included in *Bill 2* in the BoQs.

An “*Estimated Quantity*” has been provided in the BoQs to cover additional overbanding with Triflex reinforcement fleece (assuming single layer) that may be required to treat day joints and cracks within the existing surfaces, see *Bill 4, Item AB* in the BoQs. The actual quantity for additional overbanding is to be accounted for and verified during the execution of the works.

2.2.1 Existing Asphalt Surfaces

There is an area of raised asphalt located on Level 2 that will need to be fully prepared prior to installing the **Triflex DeckFloor System using Triflex Cryl Primer 222**. The existing steel ramp sections (26m long by c.50mm high) and in-situ concrete ramp sections (11m long by c.50mm high) are to be removed and replaced with a new cast in-situ ramp formed using **Flexcrete Fastfill**. The ramp lengths are to be extended from 150mm to 300mm to provide a smoother transition onto the raised asphalt area. The toe of the ramp is to be chased into existing concrete deck by 10mm to avoid feathered edges. The ramp transition onto the driveway ramp up to Level 2A is also to be smoothed out to avoid a channel being formed that may attract water. The costs associated with these works are to be included in the Tender return under *Bill 2, Item R* in the BoQs.

There is also an area of asphalt surfacing on Level 4A that will need to be fully prepared prior to installing the **Triflex DeckFloor System using Triflex Cryl Primer 222**. A new Triflex soft joint is to be provided at the interface between the asphalt and concrete deck areas (see *Bill 4, Item Y* in the BoQs).

2.2.2 Triflex Colours

The Triflex colours shall comprise the following:

- Driving Lanes – 7043 Traffic Grey 2

- Parking Bays – 6024 Traffic Green
- Pedestrian Walkways – 3020 Traffic Red [*new 1m wide pedestrian walkways to be provided between parking bays and driving lanes*]
- Bay Markings and Upstands – 9010 Pure White
- Disabled parking bays or non-parking areas – 1023 Traffic Yellow

2.2.3 Deck Preparation, Repair & Installation

The car park decks are to be fully prepared in accordance with the Triflex specification via planing, grinding or scarifying. Wheel indentations should be levelled by using Triflex or Flexcrete products. Dynamic cracks and dayjoints should be filled with Triflex Cryl Paste and overbanded as per the standard Triflex specification. The costs for fully preparing the surfaces are to be included in the Tender return as stated in the BoQs under *Bill 2*.

The specified Triflex waterproofing system is only to be installed by a Triflex Authorised Contractor in strict accordance with the specifications and standard installations details as outlined in the Triflex Project Specifications.

2.2.4 Vehicle Impact Barriers

Prior to installing the new Triflex Deck Coating systems all existing vehicle impact barriers and associated stanchions, base plates and fixings are to be removed and temporarily stored to enable the Triflex deck coating systems to be installed as per the specifications (see *Bill 3, Item A*).

There are a significant number of stanchions, base plates and fixing bolts that are heavily corroded and will need to be replaced as part of the works (see *Bill 3, Item B*). All new stanchions, base plates and fixings should be galvanised to the following specification:

- Steelwork corrosion protection shall be in accordance with Corrosivity Cat. C3 hot dip galvanised in accordance with BS EN 1461 with a minimum coating thickness of 85 microns.
- All protective coatings shall be applied in the fabrication shop, with any areas of damaged coating made good after erection by the *Contractor*, to the satisfaction of the *Engineer*.

The remainder of the existing stanchions, base plates and fixings are in reasonably sound condition and are to be cleaned back to fresh steel and treated with a proprietary anti-corrosion paint to achieve a min. standard as specified below, prior to being reinstalled at the end of the works:

- All steelwork to be painted shall be cleaned and prepared by blast cleaning to Sa 2^{1/2} (maximum profile 75 microns) in accordance with BS EN ISO 8501. Steelwork shall be primed with 4 hours of cleaning.
- Steelwork corrosion protection shall be in accordance with Corrosivity Cat. C3 to BS EN ISO 12944-2 and include 150µm zinc phosphate epoxy primer, (e.g. Sherwin Williams Macropoxy 400 or similar approved) and 60µm High Solid Polyurethane Finish (e.g. Sherwin Williams Acrolon 7300 or similar approved).

2.2.5 Upstands

Generally, upstands to perimeter walls, concrete columns, concrete kerbs/plinths etc. are to be prepared in accordance with the Triflex specification by removing existing paint or coatings to min. 150mm (see *Bill 2 Items K – Q*).

2.2.6 Line Markings

All new line markings are to be installed using Triflex products as per the Triflex specification. Line markings and running lane direction arrows are to match existing and shall be included under a separate item in the BoQs (see *Bill 4 Items AC*). Note that numbering car parking bays is **NOT** required.

2.3 Remedial Works to Existing Triflex Systems on Levels 5, 5A & 7

There are a number of areas on Levels 5, 5A & 7 where the existing Triflex coatings require remediation. The specification has been prepared by Triflex and comprises **Triflex DeckFloor System using Triflex Cryl Primer 222** (refer to **Appendix D**). The works involve localised repairs to cracks, replacement of the coatings to upstands which have delaminated or ruckled, cutting out and replacement of areas where blisters are identified, removal and remarking of crossing points and any other areas of repair required, identified and shown on the repair location plans.

The remedial repairs to the existing external Triflex deck coatings are covered under *Bill 13, Items A - D* in the BoQs. Note that the cost of the repairs should include **both** the surface preparation and the repair itself.

2.4 Removal of Block Paving & Paving Flags on Level 5

The paved pedestrian crossing point on Level 5, associated paved areas either side and in-situ concrete kerbs are to be fully removed along with the underlying bedding material and infilled with a proprietary concrete repair product. This is to comprise **Flexcrete Fastfill** bulked out at a ratio of 1:1 with a 6-10mm clean, dry aggregate. Previous investigation works have confirmed that there is an existing tanking/bitumen layer located below the existing paved areas that will need to be fully removed prior to installing the new cementitious screed. The depth of screed below the block paved areas is c. 120mm thick and c. 90mm thick for the stone flag paved area. Due to the exposed nature of this area, the *Contractor* should ensure that sufficient weather protection is provided during the works to minimise the risk of water penetration to the underlying concrete slab.

The infill area is to include the following specification:

- 10mm thick compressible filler board to be provided to all infill perimeters / interfaces with existing asphalt with 10mm x 10mm Triflex Cryl paste or Triflex Flexfiller at the surface.
- Induced joints should be formed to the infilled concrete as per the RGP drawings and typical detail and overbanded with Triflex reinforcement fleece as per the Triflex specification.
- All soft filled perimeter joints to be overbanded with Triflex reinforcement fleece as per the Triflex specification.
- Area to be finished with **Triflex DeckFloor System** (refer to **Appendix D**).

The costs for undertaking the work described above are covered under *Bill 2 Item Y – AA* in the BoQs.

2.5 Removal of Block Paving to Pedestrian Crossing on Level 3

The paved pedestrian crossing point on Level 3 and underlying bedding material are to be fully removed and infilled with a proprietary concrete repair product. This is to comprise **Flexcrete Fastfill** bulked out at a ratio of 1:1 with a 6-10mm clean, dry aggregate. Any existing tanking/bitumen layer (if encountered) should be fully removed.

The infill area is to include the following specification:

- 10mm thick compressible filler board to be provided to all infill perimeters / interfaces with existing asphalt with 10mm x 10mm Triflex Cryl paste or Triflex Flexfiller at the surface.
- An induced joint should be formed down the centre of the infilled concrete as per the typical detail and overbanded with Triflex reinforcement fleece as per the Triflex specification.
- All soft filled perimeter joints to be overbanded with Triflex reinforcement fleece as per the Triflex specification.
- A 3.8m long concrete fillet is to be formed using **Flexcrete Fastfill** to provide a smooth transition onto raised pedestrian crossing area. The toe of the fillet is to be chased into the existing concrete deck by 10mm to avoid feathered edges.
- Area to be finished with **Triflex DeckCoat System** (refer to **Appendix C**).

The costs for undertaking the work described above are covered under *Bill 2 Item T – W* in the BoQs.

2.6 Level 2B Additional Triflex Works

There is a small area on Level 2B where the existing Triflex deck coating is to be extended over an existing soft-filled construction joint to prevent seepage down the wall below to Level 1B. The cost of the works should include the temporary removal of the vehicle impact barriers and overbanding jointing required in the Triflex Specification. The work associated under this is covered under *Bill 2, Item S* and *Bill 4, Item C* in the BoQs.

2.7 Internal Concrete Repairs

A number of repairs have been identified to existing internal reinforced and precast concrete, which are to be broken out and replaced by an approved proprietary repair material. The areas to be repaired are shown on the relevant RGP Repair Location Plans and Schedule of Repairs (see **Appendix B**). Repairs are to be carried out in accordance with the detailed specification, and in accordance with the recommendations of the material manufacturer (refer to **Appendix E** for details). If further areas for concrete repair are found during the works then this should be reported to *The Contract Administrator* and/or *Engineer* for consideration. *Provisional Sums* have been included in the BoQs to cover additional concrete repairs identified

during the works for any element of reinforced concrete. The material specification for the concrete repairs is described in **Section 4.0** and **Appendix E**.

2.8 External Concrete Repairs to Precast Concrete Fin Units

Directly adjacent to the main pedestrian entrance off Blackhall Road there is an area of car park that is clad with precast concrete fin units. A number of structural repairs were completed to these units in 2011 and further repairs are required as part of this scope (see *Bill 12, Items A-J* and refer to photographs and repair locations included in **Appendix B**). In addition, a delamination survey is required as part of the scope of works to check for any further deterioration of the fin units (see *Bill 12, Item K*). A *Provisional Sum* is included to cover additional concrete repairs that may be required to the PCC fins as a result of the survey (see *Bill 12, Item L*).

The material specification for the concrete repairs is described in **Section 4.0** and **Appendix E**.

2.9 Cathodic Protection – Sacrificial Galvanic Anodes

Sacrificial galvanic anodes are to be installed in each concrete repair to mitigate against future corrosion. These have been specified by Concrete Preservation Technologies as **PatchGuard 175** anodes and should be installed as **Type 1B** as defined under Clause 5712 in the Specification for Highway Works. Further details are provided in **Section 4.2** and **Appendix F**.

2.10 Drainage Renewal/Repairs

As part of the main Triflex deck coating works all open drainage channels on Levels 2, 2A, 3, 3A, 4, 4A and 5 are to be cleaned, lined and waterproofed in accordance with the Triflex specification, to seal any longitudinal cracks and to accommodate any movement.

A full drainage CCTV survey is to be completed for all below ground drainage located on Level 1, 1A & 1B, to confirm condition of all pipework and identify any defects. This is covered under *Bill 14, Item A*. A *Provisional Sum* is included within the BoQs to cover the costs of jetting, cleaning and repair of the existing below ground drainage. This is covered under *Bill 14, Item B*.

There are several other drainage defects associated with gullies, channels and gutters that are to be remedied as part of the works. The cost for these works is covered under *Bill 14, Items C – G*.

On Level 4A there is evidence of water penetration and ingress at the interface between slab and wall upstand [Repair No. 63], possibly due to water ingress associated with Level 5 paved area. The Contractor is to investigate the source of this inflow and monitor this after the remedial works to the Level 5 paved areas are completed. The cost for these works is covered under *Bill 14, Item H* in the BoQs.

The Contractor should also clean and survey all drainage gullies, channels and pipework **at the end of the works** to ensure they are free of construction waste and excess materials. This is covered under *Bill 14, Item I* in the BoQs.

2.11 Inspect & Remediate Radflex Expansion Joints

The Radflex expansion joints installed in 2015 are to be inspected and remediated as per the Radflex specification & associated BoQs included in **Appendix G**. The full cost of these works is to be covered under *Bill 15, Items A – C* within the BoQs. A *Provisional Sum* has been included to cover any extra over items associated with the supply and installation of new Radflex S150 expansion joint nosings and the installation of M12 stainless steel fixing studs (see *Bill 15, Item D*).

2.12 Additional Concrete Repairs & Other Ancillary Works

2.12.1 Repair Nos. 18 & 90 – Copings, render & concrete repair to external wall on Level 3B

The precast concrete copings to the external wall to the rear of Level 3B have been damaged and moved by vehicles in the external delivery yard. Metal railings have also moved and bent and external blockwork and render is damaged and cracked. Repairs should be undertaken to this area to make good the copings, blockwork and external render/concrete and the costs should be provided under *Bill 16, Item A* in the BoQs.

2.12.2 Repair No. 36 - Repairs to mansard roof on Level 5B

The damp and rotten timber rafters and plywood boarding to the mansard roof on Level 5B are to be replaced and new lead flashing provided to enhance protection to the joint. Details of the proposed repairs are included on RGP drawing no. K37544/A3/07 included in **Appendix B**. The area affected is approx. 1.0m x 6.5m in plan. The cost of the roof repairs should include all temporary access and/or scaffolding arrangements to be undertaken by appropriated qualified operatives. All works to be undertaken under a safe system of work with members of the public protected from falling debris at all times. The cost of this work should be stated under *Bill 16, Item B* in the BoQs.

2.12.3 Repair No. 45 – Lintel repair above external window to stairwell

The external concrete lintel located above the window to the stairwell to Level 6 & 7 in WSCCP1 has cracked (c. 15m above ground) and is to be repaired. The cost of the repair should include all temporary access and/or scaffolding arrangements to be undertaken by appropriated qualified operatives. All works to be undertaken under a safe system of work with members of the public protected from falling debris at all times. The cost of this work should be stated under *Bill 16, Item C* in the BoQs.

2.12.4 Repair No. 48 – Support strapping to precast quoin unit on Level 7

The temporary support strapping to the precast concrete quoin or spandrel panel on Level 7 is starting to corrode. Strapping is to be cleaned back and re-painted with a proprietary anti-corrosion paint. The specification is as follows:

- All steelwork to be painted shall be cleaned and prepared by blast cleaning to Sa 2 ^{1/2} (maximum profile 75 microns) in accordance with BS EN ISO 8501. Steelwork shall be primed with 4 hours of cleaning.
- Steelwork corrosion protection shall be in accordance with Corrosivity Cat. C3 to BS EN ISO 12944-2 and include 150µm zinc phosphate epoxy primer, (e.g. Sherwin Williams Macropoxy 400 or similar approved) and 60µm High Solid Polyurethane Finish (e.g. Sherwin Williams Acrolon 7300 or similar approved).

The cost of this work should be stated under *Bill 16, Item D* in the BoQs.

2.12.5 Repair No. 52 – Render repair on Level 5A

There is a small section of external render on the adjoining building that is to be repaired. The cost of this work should be stated under *Bill 16, Item E* in the BoQs.

2.12.6 Repair No. 86 – Render repair above opening to Level 3A

There is a small section of external render above the window opening to Level 3A that is to be repaired. The cost of this work should be stated under *Bill 16, Item F* in the BoQs.

2.12.7 Repair No. 87 – Concrete repairs to lintel above main car park exit on Level 1B

Previous concrete repairs to the external concrete lintel located above the main car park exit appear to have delaminated and are to be inspected and repaired (see *Bill 16, Item G*). A *Provisional Sum* has been included to cover these repairs.

2.12.8 Repair No. 88 – Concrete repair to external quoin unit

One of the precast concrete quoin units to the external façade has been damaged by vehicle impact and is to be repaired. The cost of this work should be stated under *Bill 16, Item H* in the BoQs

2.12.9 Level 1 Direction Arrows & Markings

All existing direction arrows, line markings and wordings on the slab surfaces to Levels 1, 1A & 1B are to be removed and renewed on a like-for-like basis. The new markings should be undertaken using an MMA cold plastic lining system or similar approved. The costs for competing these works are covered under *Bill 16, Item I*.

2.12.10 Pressure Wash & Clean All Internal Areas

At the end of the rehabilitation works the Contractor is to undertake a full clean and pressure wash of **ALL** car parking surfaces, including both existing areas of Triflex deck coatings and new areas of Triflex deck coatings. All stairwell accesses should also be pressure washed and cleaned at the end of the works. This cost associated with this is covered under *Bill 16, Item J* in the BoQs.

All drainage gullies, gutters and channels should also be fully cleaned, and all waste removed as noted elsewhere and included under *Bill 14, Item I* in the BoQs.

2.12.11 Re-painting Works – WSCCP1

The scope of the works includes a *Provisional Sum* to cover the anticipated costs to internal re-paint the walls, soffits and columns within WSCCP1 on Levels 1B, 2B, 3B, 4B, 5B & 6. The re-painting works are included in the BoQs under *Bill 16, Item K*.

3.0 PRELIMINARIES

To be considered together with “*Schedule 5 – Preliminaries B*” document issued separately as part of the tender documents.

3.1 Bill of Quantities

The Bill of Quantities (BoQs) is included in **Appendix A** and describes the anticipated quantity and quality of the repair works to be carried at the Westmorland Shopping Centre Car Park. The exact nature and extent of the work to be performed is to be ascertained by reference to the drawings and relevant specifications.

Work which cannot be measured has been given as *Provisional Sums*. A rate or price should be entered against each item in the BoQs, whether quantities are stated or not. If any item is left unpriced it shall be assumed that the cost of the work referred to therein has been covered by other rates or prices in the BoQs.

Any arithmetical errors in the Tender submission will be corrected by *The Contract Administrator* without reference to the Tenderer, and the Tender total amended accordingly. Tenders will be compared on the basis of corrected prices.

The BoQs shall be regarded as approximate at this stage due to the inherent difficulties in accurately quantifying the amount and extent of the anticipated concrete repair. Therefore, the Tenderer should accurately measure and record each and every concrete repair that is undertaken (in accordance with the Method of Measurement detailed in **Section 5**) and inform the *The Contract Administrator* if there are any significant differences from the approximate quantities detailed in the BoQs. In this situation an opportunity for remeasurement will be available during and after the works.

The description of work given in the BoQs is for the purpose of identifying the item, but the prices to be inserted are for the full and inclusive value of the work. The Tenderer must therefore carefully read the appropriate clauses of the relevant Specification documents (included in **Appendix C – G**) and ascertain the full nature of the work involved and price accordingly. Any ambiguity, discrepancy or doubt the Tenderer may have as to the true extent of the work involved shall be referred to the *The Contract Administrator* for clarification in writing as early as possible in the Tender Period. No claim for extra payment will be recognised at a later date consequent upon any such ambiguity, discrepancy or doubt upon the part of the Contractor.

3.2 Measurement & Quantities

Where classification is given in this document as being between two limiting dimensions then the interpretation shall be as exceeding the first dimension and not exceeding the second.

Depths of repairs are to be measured as maximum depths.

Where the unit of billing is the metre, quantities shall be billed to the nearest whole unit. Fractions of a unit less than half shall be disregarded and all other fractions shall be regarded as a whole unit. Where the application of the above clause would cause an entire item to be eliminated, such item shall be enumerated stating the size.

3.3 Item Descriptions

All dimensions in the item descriptions are generally in the sequence of length, width and depth of repair. Arris repairs also include a description of girth.

Unless otherwise specifically stated in the BoQs or herein, the following shall be deemed to be included with all items:

- Labour and all costs in connection therewith
- Materials, goods and all costs in connection therewith
- Fitting and fixing materials and goods in position
- Plant and all costs in connection therewith
- Waste of materials
- Establishment charges, overhead charges and profit

3.4 Drawings

Repair Location Plans and other relevant drawings are included in **Appendix B** and are as follows:

- K37544/A1/01 – Repair Location Plan – Level 1
- K37544/A1/02 – Repair Location Plan – Level 2
- K37544/A1/03 – Repair Location Plan – Level 3

- K37544/A1/04 – Repair Location Plan – Level 4
- K37544/A1/05 – Repair Location Plan – Level 5
- K37544/A1/06 – Repair Location Plan – Levels 6 & 7
- K37544/A3/07 – Level 5B Roof Repairs & Details

The plans identify each individual repair with a unique reference number and should be read in association with the photographic records, the Schedule of Repairs and Bill of Quantities. The Contractor shall keep a log of each repair that is completed (including any additional repairs undertaken) to enable a set of As-Built plans to be completed by *The Engineer* at the end of the works.

Detailed topographical survey drawings of each car park level have recently been completed by **Atlantic Geomatics** and will be available upon request. Reference should be made to the existing car park survey drawings when reinstating the line markings and parking bay positions at the end of the works.

3.5 Provisional Sums

Where this document requires a “*Provisional Sum*” or “*Estimated Quantity*” to be given in accordance with this clause, the terms are defined as a sum or quantity provided for work or for costs which cannot be entirely foreseen, defined or detailed at the time the tendering documents are issued. In these instances, a provisional or estimated rate has been provided in the BoQs to ensure parity for all Tenderers. These guideline rates will be subject to remeasurement during the works. It should be noted that items identified as a “*Provisional Sum*” or “*Estimated Quantity*” are not guaranteed items of work and may be omitted from the contract during the works at the discretion of *The Engineer* and/or *Contract Administrator*.

3.6 Working Hours

Normal car park opening hours are as follows:

Monday to Saturday

- Open: 7.00 am
- Entrance Closed: 6.00 pm (No access after this time)
- Exit Closed: 7.00 pm

Sunday and Bank Holidays

- Open: 10.00 am
- Entrance Closed: 4.00 pm (No access after this time)
- Exit closed: 5.00 pm

A normal working day shall be 8am to 6pm Monday to Saturday. Work to be undertaken outside this period shall be classified as “*outside normal working hours*” and will be subject to strict noise pollution criteria as discussed in the *CDM Pre-Construction Information* provided by RGP.

Where possible the car park is to remain fully operational and in use by the public throughout the repair works. Some areas will be allowed to be closed off for works and for safety, the details of which will be agreed by SLDC. In these instances the contractor shall establish traffic and pedestrian management systems. Where temporary car park closures are not permitted the Contractor should allow for specific works to be undertaken outside normal working hours i.e. evenings, overnight and weekends. Repairs located within running lanes have been identified as separate repairs and therefore can be priced accordingly.

3.7 CDM Issues, Noise & Pollution

In accordance with the CDM Regulations 2015 RGP will fulfil the role of *Principal Designer*. Full details of the relevant CDM and Health & Safety Issues are outlined in the *CDM Pre-Construction Information* provided by RGP. However, it should be reiterated that the car park is located within the centre of Kendal and is surrounded by a number of residential properties including a retirement home. Therefore, any operations likely to cause significant noise disturbance (e.g. pneumatic breakers, drilling etc.) are not to be undertaken outside normal working hours unless the Contractor can provide attenuation measures (e.g. acoustic enclosures etc.) that satisfy the criteria established in the *CDM Pre-Construction Information*. Details of how this is to be achieved should be clearly identified in the Contractors’ Method Statements. In these instances the Contractor shall be responsible for contacting the residents in the surrounding area and informing them of when work is likely to be noisy i.e. dates, times and duration. Ongoing liaison with the SLDC Environmental Protection Group is advisable during the works.

The Contractor is to ensure that noise and dust pollution is minimised during works undertaken during normal working hours within the car park to prevent disturbance to

car park users and damage to vehicles. Details of how this is to be achieved should be clearly identified in the Contractors' Method Statements.

3.8 Traffic Management, Security & Means of Access

The Contractor shall be responsible for providing adequate traffic and pedestrian management systems (including signage and temporary safety barriers etc.) within and without the car park during the repair works.

Responsibilities for the provision, erection, maintenance, dismantling and removal of means of access, weather protection and hoisting shall be the responsibility of the Contractor.

3.9 Guarantees

The Contractor shall provide a **10 year** back-to-back guarantee to cover materials and labour for **ALL** elements of the repair works including the waterproof deck coatings and new line markings, channel drains, expansion joints and concrete repairs.

4.0 **MATERIAL SCHEDULE FOR REINFORCED CONCRETE REPAIRS**

The specification for the repairs to the reinforced concrete elements is provided by Flexcrete/Akzonobel. Full details and specification for these materials is included in **Appendix E**.

Each repair is to include Galvanic (sacrificial) anodes as provided by Concrete Preservation Technologies. Full details and specification for the sacrificial anodes is presented in **Appendix F**. The anticipated number of Galvanic Anodes per repair is included within each relevant item from the BoQs (shown as +X GA), where X represents the number of galvanic anodes required within each repair type. Therefore, the rates for all concrete repairs must **include** the cost of the installation of the required number of Galvanic Anodes.

4.1 Concrete Repair Materials

Flexcrete products mainly comprise polymer modified fibre reinforced shrinkage compensated cementitious compounds, CE-marked in accordance with BS EN 1504, and British Board of Agrément Certified. A number of these products will be common to a number of the concrete elements requiring repair. All products are suitable for use with Cathodic Protection systems.

- **STEEL REINFORCEMENT PROTECTOR 841:** a 2-component polymer modified coating used on exposed steel reinforcement to provide a flexible corrosion preventative coating prior to the application of a repair mortar.
- **CEMPROTEC MCI-2020:** a surface applied corrosion inhibitor for the protection of reinforcement in chloride contaminated concrete.
- **MONOMIX:** a single component medium density polymer modified fibre reinforced shrinkage compensated mortar used for structural repairs. It is applied by hand at thicknesses up to 80mm in a single layer. It is mixed with clean water on site.
- **MONOLITE:** a single component lightweight polymer modified fibre reinforced shrinkage compensated mortar used for non-structural repairs or for soffit repairs. It is applied by hand at thicknesses of up to 100mm in a single layer.
- **FASTFILL:** a fast-setting high strength polymer modified repair mortar used typically on roadways, car park decks, etc., with rapid resistance to traffic. It can be applied at depths of 100mm as supplied and can be bulked out for repairs in

excess of this down to 300mm. For the infill concrete areas on Levels 3 & 5, Fastfill is to be bulked out at a ratio of 1:1 with a 6-10mm clean, dry aggregate.

- **MONOPOUR:** a high-performance polymer modified non-shrink cementitious micro concrete for large areas of concrete repair. The product can be pumped or poured.
- **CURING MEMBRANE:** a water based curing membrane for use with the Flexcrete range of repair mortars and coatings.
- **MONODEX ULTRA:** a water-based decorative weatherproof and anti-carbonation coating with elastomeric properties. It prevents the growth of mould and fungi and is available in a range of colours.

4.2 Sacrificial Galvanic Anodes

The following materials are supplied by Concrete Preservation Technologies and shall be used for the installation of the Galvanic Anodes for each concrete patch repair:

- **PATCHGUARD 175 SACRIFICIAL ANODES:** PatchGuard 175 (zinc weight = 65g) is an individually connected sacrificial anode which acts to prevent corrosion initiation in reinforced concrete structures. They are applied into patch repairs on reinforced concrete structures resulting from attack by chloride salts and carbon dioxide. The galvanic anodes are specified as a **Type 1B** anode as defined under Clause 5712 in the Specification for Highway Works as follows:
 - **Type 1B** – installed in holes drilled into the existing concrete substrate within the repair area and connected to the existing reinforcement.
- **DUOCRETE PG MORTAR:** infill mortar to be used for the installation of the PatchGuard 175 sacrificial anodes.

4.3 Preparation, Repair & Installation

Preparation of the substrate prior to the application of these products should typically comprise the following:

Mechanically remove all damaged concrete back to a sound core. Wherever possible, the full circumference of the steel reinforcement should be exposed to at least 25mm behind the bars and 50mm beyond the point at which corrosion is visible. On cutting back, feather edges must be avoided. The perimeter of the repair area

should be stepped to a depth of 10mm by means of saw, disc cutting or preferably using a power chisel. The areas to be repaired must be free from all unsound material, i.e. dust, oil, grease, corrosion by-products and organic growth. Smooth surfaces should be roughened, all loose material and surface laitance removed, and reinforcement cleaned to bright steel using wet grit blasting techniques or equivalent approved methods. The prepared substrate should be thoroughly soaked with clean water until uniformly saturated without any standing water.

The placement and curing of the Flexcrete repair mortars shall be undertaken by an approved Contractor in strict accordance with the manufacturer's specifications as outlined in **Appendix E**.

The installation of the Galvanic Anodes shall be undertaken by an approved Contractor in strict accordance with the manufacturer's specification as outlined in **Appendix F**.

5.0 CONCRETE REPAIR MEASUREMENT

5.1 General Repairs and Repairs to Arrises

The *Standard Method of Measurement for Concrete Repair* [1] provides the following details for general repairs:

- a) In general, repairs on flat surfaces do not include for the re-creation of an arris the repair shall be measured by area and depth in accordance with Fig. 1.
- b) If a repair to a beam, column or slab edge includes one arris and the girth is <400mm it shall be measured in accordance with Fig. 2.
- c) If a repair to a beam, column or slab edge includes two arrises and the girth is <800mm it shall be measured in accordance with Figs. 3.1 and 3.2.
- d) Repairs to flat surfaces which include an arris and which lie outside the maximum girth of 400mm shall also be measured as two repairs. The arris repair shall be taken as 400mm girth as Fig. 2 and the other repair shall be measured as a repair to a flat surface of the remaining area as Fig. 1.
- e) A similar approach shall be adopted if the repair covers two arrises and the girth of the repair is >800mm. The repair would be measured as three separate repairs; two single arris repairs with a girth of 400mm as Fig 2. with the central flat surface measured as Fig. 1.
- f) An exception to this is repairs to corners of slabs or balconies and the like. Repairs measured in this category include for the re-creation of three arrises e.g. two horizontal and one vertical meeting as a common point. In this case the area shall be measured as the sum of the areas on the individual faces and recorded as a specific item see Fig 4.
- g) Repairs including two corners of a slab or balcony and the like involving five arrises shall be measured as two repairs with the centre line of the slab taken as the dividing line between repairs and recorded as a separate item as Fig 5.
- h) The depth categories are according to maximum depth of the repair measured perpendicular to the face of the member and taken within a substantial proportion of the repair area. Localised deeper areas which in total do not exceed 10% of the area shall not be taken into account when assessing the repair depth. Accidental overbreak shall not be included when assessing the

depth of a repair. For repair to corners of slabs of balconies and the like, as in fig. 4, where repairs span more than one face of a member, the depth (including the specified depth of concrete removal from behind bar) shall be measured on the largest face and this depth used to categorise the repair.

- i) Large repairs comprising complex shapes are to be divided in an appropriate manner. Where three or more sides exist, large variations in depths occur or a significant number of small localised repairs (possibly of differing orientation) are deemed to be one complex repair, these shall be measured as individual repairs with the balance also measured as separate items.

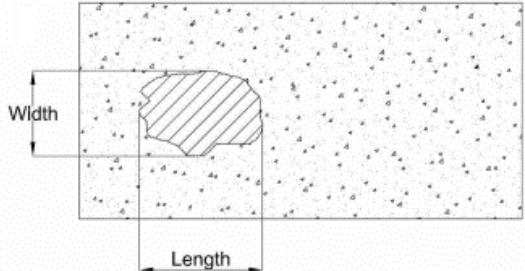
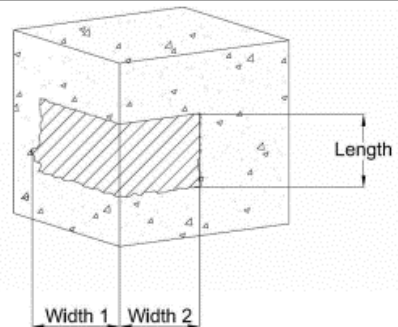
Defect Type	Description	Diagram
1	Vertical Surface, no arrises	 <p>Fig 1.</p> <p>Area = Length x Width</p> <p>Depth of repair = maximum depth of the repair within a substantial proportion of the repair area.</p>
2	Soffit Surface	As Fig. 1
3	Deck Surface	As Fig. 1
4	Two Vertical surfaces, one arris (e.g. column)	 <p>Fig 2.</p> <p>Length is longest length measurement Width measurements should be taken on a left to right basis.</p> <p>Where the area of damage includes a soffit this is recorded as width 1.</p> <p>Girth = Width 1 + Width 2</p> <p>Depth of repair = maximum depth of the repair within a substantial proportion of the repair area.</p>
5	Two Horizontal surfaces one arris including a soffit (e.g. beam or slab edge)	As Fig. 2

Figure 5.1 Illustrations of Repair Measurement

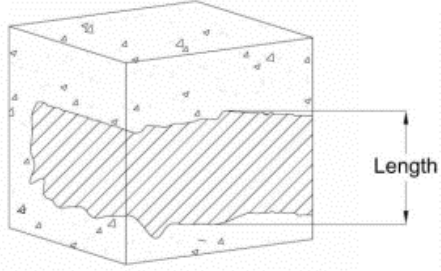
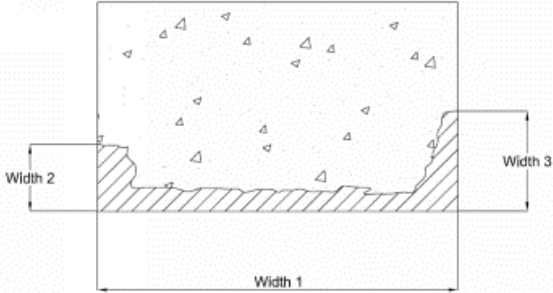
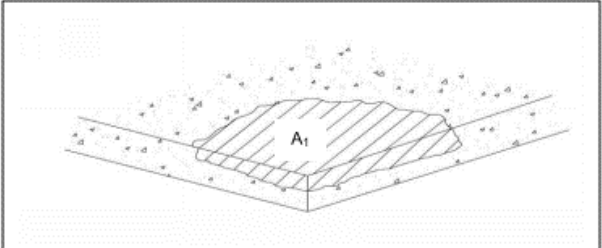
<p>6</p>	<p>Three Vertical surfaces, two arrises (e.g. column)</p>	 <p>Fig 3.1</p>  <p>Fig. 3.2 When an area of damage has two arrises and three planes the central plane width dimension should be recorded as width 1. Remaining width dimensions should be taken on a left to right basis. $Girth = Width\ 1 + Width\ 2 + Width\ 3$</p> <p>Depth of repair = maximum depth of the repair within a substantial proportion of the repair area.</p>
<p>7</p>	<p>Three horizontal surfaces, two arrises one soffit (e.g. Beam)</p>	<p>As Fig 3.1 & 3.2</p>
<p>8</p>	<p>Slab corner repairs</p>	 <p>Fig 4. Repairs on slab extending along two edges, measured as one repair A_1</p>

Figure 5.1 (cont.) Illustrations of Repair Measurement

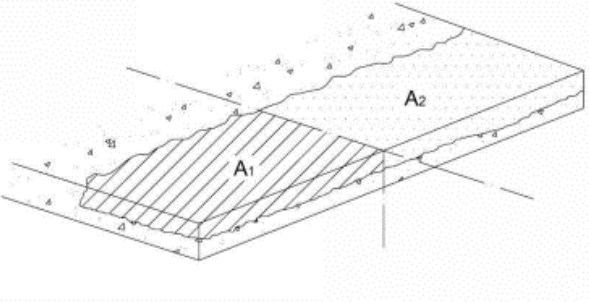
9	Repairs on slab extending along three edges	 <p>Fig. 5 Repairs on slab extending along three edges, measured as two repairs – one of area A1, and one of area A2.</p>
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Figure 5.1 (cont.)

Illustrations of Repair Measurement

6.0 REFERENCES

- [1] Concrete Repair Association, *Standard Method of Measurement for Concrete Repair*, 3rd Edition, August 2015
- [2] British Standards Institution, *Products and Systems for the Protection and Repair of Concrete Structures*, BS EN 1504, 2005
- [3] R. G. Parkins & Partners Ltd, *Westmorland Shopping Centre Car Park, Kendal – Annual Inspection Report*, ref: K31168/AIR/TM, January 2019